

Grammatically-guided resolution of filler-gap dependencies: An investigation of Chinese
multiple dependencies

By

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Abstract

Previous studies have provided evidence that the parser avoids positing gaps in grammatically unlicensed positions such as islands, suggesting that the grammar constrains the construction of filler-gap dependencies (e.g., Stowe, 1986). However, such evidence does not provide evidence against an alternative interpretation which posits that islands are simply processing bottlenecks and thus the parser is unable to establish a filler-gap dependency within these domains (e.g., Kluender & Kutas, 1993; Hofmeister & Sag, 2010). To this end, Wagers and Phillips (2009) provide evidence that grammatical knowledge is not only used to avoid establishing wh-dependencies when prohibited, but is also in motivating the active search for gap positions when required by the grammar. Building on Wagers and Phillips (2009), the current study examines whether gap-filling is predictive and grammatically-guided in a new domain: Chinese topicalization. In a self-paced reading study with Chinese native speakers (n=40), we compared the processing of sentences with coordinated verb phrases to that of sentences with post-verbal adjunct phrases. Coordinated VPs in English and Chinese require across the board extraction (*Who does John know _ and love _/*Mary?*) while extraction from the second position of post-verbal adjunct phrases is optional but not required (*What did*

eat _ after washing _/the dishes?). It is found that the parser actively searches for a gap after positing a gap in the first coordinated VP while no gap-filling is observed in the post-verbal adjunct phrases. These results demonstrate that grammatical knowledge actively guides the incremental resolution of filler-gap dependencies.

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Table of Contents

Abstract.....	iii
Acknowledgements.....	v
1. Introduction.....	1
2. Literature Review.....	2
2.1 <i>Active gap-filling</i>	2
2.2 <i>Limitations of island studies and the advantages of investigating multiple dependencies</i>	6
2.3 <i>The present study</i>	13
3. Experiment.....	19
3.1 <i>Method</i>	19
3.1.1 <i>Self-paced reading task</i>	19
3.1.2 <i>Plausibility rating study</i>	24
3.2 <i>Data Analysis and results</i>	28
3.3 <i>Discussion</i>	31
4. Conclusions.....	33
References.....	34
Appendices.....	37

1. Introduction

In a sentence with a displaced element such as a wh-phrase in English, the moved wh-phrase is called filler, and the empty space left behind is the gap. For example, in a sentence like (1), the wh-phrase ‘who’ is base generated after the preposition ‘for’, it is the filler and the space left behind is the gap.

(1) I don’t know *who* David is looking for *t* .

When a filler is encountered, the parser has to search for the base position in which it can be interpreted in order to resolve the filler-gap dependency. It has been argued that wh-movement is constrained by the grammar in that there are positions from which extraction is grammatically unlicensed; these positions have been referred to as ‘islands’ (Ross, 1967). For example, extraction from within a relative clause is prohibited. The sentence in (2b), the interrogative counterpart of the grammatical sentence in (2a) is ruled out because the Noun Phrase ‘the book’ has been extracted from within the relative clause island ‘the woman that brought the book’.

(2) a. I saw [the woman that brought the book].

b. * *What* did you see [the woman that brought ____]?

Investigation of the resolution of the wh-dependencies can provide insight into what kind of information the parser utilizes during on-line sentence processing and it is

informative for if the grammar plays a role in sentence processing; if the grammar is respected or even plays a more active role.

A number of previous studies (Stowe, 1986; Traxler & Pickering, 1996; Pickering, Barton, & Shillcock, 1994; McElree & Griffith, 1998; Omaki, Lau, Davidson White, & Phillips, 2010) have found that the parser avoids positing gaps in islands, suggesting that gap-positing is constrained by grammar. This literature will be reviewed in the next section. I will then discuss more recent studies which investigate constructions with multiple dependencies to test if the parser actively uses grammatical information for gap-positing instead of gap avoidance, providing evidence that the grammar actively guides dependency formation. The following sections report on a new study which extends this investigation to a new domain: Chinese topicalization. Chinese is a language without overt wh-movement, but it is argued that topicalization in Chinese involves movement (Qu, 1994; Lin, 2006). Therefore, Chinese topicalization can serve as a case to investigate resolution of filler-gap dependencies in a wh-in-situ language.

2. Literature Review

2.1 Active gap-filling

There is evidence that the parser processes sentences incrementally, actively searching for a gap without waiting for bottom-up information that there is a missing constituent after the potential gap licenser (Crain & Fodor, 1985; Stowe, 1986; Lee, 2004, Aoshima, Phillips, & Weinberg, 2004). For example, Stowe (1986) compared the processing of sentences without extraction like (3a) and those with extraction like (3b).

(3) a. IF-Clause: My brother wanted to know if Ruth will bring us home to
Mom at Christmas.

b. WH-POBJ: My brother wanted to know who Ruth will bring us home
to __ at Christmas.

(3a) is a declarative sentence with no gaps; in contrast, (3b) contains a doubtless gap in the prepositional object position, the other two possible gap positions are filled by overt nouns 'Ruth' and 'us'. It was predicted that if the parser posits a gap in a certain position which is filled by an overt noun phrase, processing difficulty could be expected due to a violation of the prediction of the gap. Consequently, reading time should slow down in this region; this is called filled-gap effect. Stowe was interested in comparing reading times in the filled object position in (3b) as compared to (3a) in order to see if filled-gap effect can be observed, providing evidence if the parser processes the sentence incrementally and posits a gap after a possible gap licenser before coming to bottom-up information. Significant reading time slowdown was observed at the filled object 'us' in (3b) compared to (3a), which provided evidence that there is filled-gap effect. Upon

encountering a potential gap licenser, ‘bring’ in this case, the parser posits a gap in its object position before any direct evidence in the input signaling there is a missing constituent.

Previous studies also provided evidence that the active gap-filling is subject to grammatical constraints in that the parser avoids positing gaps in positions that are not licensed by the grammar, such as islands. In the second experiment of Stowe (1986), sentences with complex noun phrase islands in which extraction from within prepositional phrases was not allowed, were investigated. (4a) is the *if*-subject condition in which a prepositional phrase was included in the subject noun phrase; (4b) is constructed by replacing ‘if’ with ‘what’ and removing the noun phrase. ‘the silly story about Greg’s brother’ is a complex NP island from which extraction is prohibited. If processing of filler-gap dependencies is constrained by the grammar, the parser will avoid establishing wh-dependencies within islands; consequently no filled-gap effect can be observed at the filled object ‘Greg’s brother’ although the preposition ‘about’ is a possible gap licenser; thus, no reading time difference in this region can be expected between (4a) and (4b).

(4) a. The teacher asked *if* [the silly story about Greg’s brother] was supposed to mean anything.

b. The teacher asked *what* [the silly story about Greg’s brother] was supposed to mean__.

The results showed no reading time slowdown at the filled object position in (4b) compared to (4a). The lack of a filled-gap effect provided evidence that the parser avoids positing gaps in grammatically unlicensed positions and grammatical knowledge is respected in on-line processing. Stowe (1986) showed that the parser actively posits gaps incrementally only in licit positions.

In addition to investigating filled-gap effects, gap-filling can also be studied by manipulating plausibility; greater processing difficulty is expected at the gap licenser if the filler is an implausible argument of the licenser compared to a plausible argument (Traxler & Pickering, 1996). For example, in (5a), the displaced element ‘the pistol’ is a plausible argument of the verb ‘shot’, while in (5b), the combination of ‘the garage’ and ‘shot’ is implausible. The eye-tracking study showed that the mean reading time slowed down at ‘shot’ in (5b) compared to (5a).

(5) a. That’s *the pistol* with which the heartless killer **shot** the hapless man...

b. That’s *the garage* with which the heartless killer **shot** the hapless man...

It was found in several studies that plausibility effects are absent in islands (Traxler & Pickering, 1996; Pickering, Barton, & Shillcock, 1994; McElree & Griffith, 1998; Omaki, Lau, Davidson White, & Phillips, 2010), providing evidence that grammatical constraints are respected and gaps are not posited within islands. For example, there is a subject relative clause island ‘who wrote unceasingly and with great dedication’ in (6). (6a) and (6b) differ in that ‘the book’ in (6a) is a plausible argument of the verb ‘write’ in the

islands, while ‘the city’ is an implausible argument of ‘write’. No evidence for plausibility effect was found, indicating that the parser utilizes grammatical knowledge during incremental resolution of wh-dependencies.

(6) a. We like *the book* that the author [who wrote unceasingly and with great dedication] saw while waiting for a contract.

b. We like *the city* that the author [who wrote unceasingly and with great dedication] saw while waiting for a contract.

2.2 Limitations of island studies and the advantages of investigating multiple dependencies

Studies on islands have provided evidence that the parser avoids positing gaps in grammatically unlicensed positions. However, such negative evidence (gap avoidance) is not strong enough to argue against an alternative interpretation, which is that islands are simply bottlenecks for processing and therefore the parser cannot establish filler-gap dependencies within them (Deane, 1991; Kluender & Kutas, 1993; Kluender, 2004; Hofmeister & Sag, 2010).

To this end, Phillips (2006) investigated whether the parser posits gaps within islands (thus suggesting that they are not processing bottlenecks) if the ungrammaticality can potentially be rescued later on in the sentence. A parasitic gap is a kind of gap inside an island that can be rescued by the presence of another gap outside of the island. For

instance, (7a) shows that extraction from the direct object of ‘repair’, which is inside the subject, is ungrammatical since that gap is in an island. (7b) shows that extraction from the direct object of the main clause, on the other hand, is grammatical since it is outside an island. As is shown in (7c), when the unacceptable gap (after repair as in 7a) is combined with the acceptable gap (after damage in 7b), the result is acceptable. For this reason, the first gap (after repair) in (7c) is referred to as a parasitic gap, as its acceptability is contingent on the appearance of a second gap later in the sentence.

(7) a. *What did the attempt to repair___ultimately damage the car?

b. What did the attempt to repair the car ultimately damage___?

c. What did the attempt to repair____{pg} ultimately damage___?

However, distribution of parasitic gaps is restricted. For example, if a gap is in a finite relative clause within the subject, it cannot be rescued by another gap as is shown in (8).

(8) *What did the reporter that criticized___eventually praise___?

Phillips (2006) examined if the parser always avoids positing gaps in islands even if it is possible that the ungrammaticality can be rescued later in the sentence. In the self-paced reading study, plausibility and island type (rescuable-infinitive island vs. non-rescuable-finite island) were manipulated. (9a) is an example of a sentence with a rescuable island, the first verb is infinitive (‘to expand’); (9b) illustrates sentences with a non-rescuable island, the first verb is finite (‘expanded’).

- (9) a. The school superintendent learned *which schools/high school students* the proposal to **expand** drastically and innovatively upon the current curriculum would overburden *t* during the following semester.
- b. The school superintendent learned *which schools/high school students* the proposal that **expanded** drastically and innovatively upon the current curriculum would overburden *t* during the following semester.

The ‘illicit’ gap after the first verb can be rescued by another verb in the main clause only when the first verb is not finite. Therefore, if the parser always avoiding positing gaps in islands due to processing difficulty, no plausibility effect can be observe at the first verb ‘expand’ in (9a) or (9b); but if the processing is incremental and grammatically accurate, the parser will posit gap after ‘expand’ in (9a) but not in (9b) as only the gap in (9a) is rescuable.

It was found that in sentences as (9a), in which the first verb is infinitive, reading time slowed down at the first verb when the wh-phrase is an implausible argument of the first verb compared to plausible argument, which was an indication of gap-positing. On the other hand, in sentences like (9b), in which the first verb is finite, no significant reading time difference was observed at the first verb between plausible and implausible conditions. This study provided evidence that comes from gap-positing rather than gap-avoidance in islands, challenging the notion used to criticize previous studies on gap avoidance like Stowe (1986) that islands are merely processing bottlenecks.

Wagers and Phillips (2009) looked at multiple dependencies to investigate in which environment the parser posits gaps. They examined sentences with coordinated verb phrases (VP) as (10), in which ‘energetically discussing’ and ‘slowly sipping’ are two coordinated VPs.

(10) a. Coordinated VP, Plausible

The wines which the gourmets were energetically discussing__or slowly **sipping**__during the banquet were rare imports from Italy.

b. Coordinated VP, Implausible

The cheeses which the gourmets were energetically discussing__or slowly **sipping**__during the banquet were rare imports from Italy.

In coordinated sentences the grammar requires extraction across the board, so the gaps after these two verbs (‘discuss’ and ‘sip’) are both obligatory. If grammatical knowledge actively guides formation of filler-gap dependencies, the parser has to posit a gap after the second coordinated verb ‘sip’, so a reading time slowdown should be observed at the second verb when the filler is ‘cheeses’ compared to ‘wines’, as cheese is an implausible argument of the verb ‘sip’.

However, there is also an alternative interpretation, which is that dependency formation is motivated by the drive to interpret as much of the partial structure as possible and thus gap-filling is observed at both gap sites. So they also included a second type of

sentences: sentences with post-verbal adjuncts like (11), in which the gap after the second verb ‘sip’ is not required by the grammar, it’s optional.

(11) a. Adjunct Clause, Plausible

The wines which the gourmets were energetically discussing__before slowly
sipping the samples during the banquet were rare imports...

b. Adjunct Clause, Implausible

The cheeses which the gourmets were energetically discussing__before slowly
sipping some wine during the banquet were rare imports...

If gap-filling is driven by maximal interpretation, a second gap should be posited in (11). But if it’s driven by the grammar, a second gap will not be posited. Comparing these two types of sentences, (10) and (11), if a second gap is posited in coordinated structures as (10) but not in adjuncts as (11), it can provide evidence that the grammar plays an active role in gap-filling.

On the other hand, another possibility is that gap-positing is filler-driven, which is that gap-positing is driven by the requirement of the filler to find a gap position and resolve the dependency; as long as a single verified gap position is located, the requirement of the filler is satisfied, and gap-searching will stop after the first gap is posited; in this case, no second gap will be posited in (10) or (11).

To test if the plausibility manipulation is effective, an off-line plausibility study was conducted, which asked participants to judge if combinations of arguments and verbs

used in the study were plausible or not on a five-point scale, with ‘1’ being absolutely implausible and ‘5’ being absolutely plausible. It was found that implausible combinations like the subject and the second verb in (10b) and (11b) were rated significantly lower than plausible combinations as the subject and the first verb in all sentences as well as subject and the second verb in (10a) and (11a). The results demonstrated that the manipulation was effective.

The results of the self-paced reading task showed significant reading time slowdown in the spill-over region (two regions after the second verb ‘sip’) in coordinated structures as (10b) compared to (10a); while no such reading time slowdown was found in either the critical region or the spill-over region in adjuncts as (11b) compared to (11a).

There was a potential concern that the reading time slowdown was observed in the spill-over region, where in these sentences, bottom-up evidence had been available to the parser. To address this issue, the stimuli in the second experiment were modified so that the bottom-up information that indicated whether there was a gap was moved further away from the critical verb (e.g. *The adhesive coating/#The computer program* that the talented engineer designed *t* for his boss and methodically **sprayed** the special test surfaces with *t* in his new laboratory...). In their stimuli, there were two coordinated verbs, and the second verb (e.g. ‘spray’) was the critical region. Plausibility between the filler and the second verb was manipulated (e.g. ‘the adhesive coating’ as a plausible argument of ‘spray’; ‘the computer program’ as an implausible argument). There was a prepositional phrase after

the second verb, inserting regions between the critical verb and the bottom-up information. The results showed that plausibility effect was observed before the parser encountered the bottom-up evidence. Therefore, the study provides evidence that grammatical knowledge is not only respected to avoid positing gaps in illicit positions in on-line processing, but it also actively promotes the search for gap positions when required by the grammar.

Investigation of these two structures has advantages over previous island studies in that it can avoid the problem raised by absence of evidence (Wagers & Phillips, 2009). Instead of examining environment in which gap-positing can never happen, coordinated structure provides environment in which gap-positing is obligatory if a second gap is posited after the first gap, therefore the role of grammar in incremental processing can be proven by positive evidence, gap-positing in a certain domain.

Previous studies provide evidence that the parser avoids positing gaps in grammatically unlicensed positions such as islands (e.g. Stowe, 1986), which suggests that construction of filler-gap dependencies is constrained by the grammar. Several studies (e.g. Wagers & Phillips, 2009) step further providing evidence for gap-positing instead of gap-avoidance in islands, which excludes the processing bottleneck interpretation of islands and suggests that establishment of wh-dependencies is incremental and actively-guided by the grammar.

Following Wagers and Phillips (2009)’s proposal, this study examines the role of grammar by looking at if the parser only posits gaps in grammatically obligatory positions but not in positions which are not required by the grammar. Consistent with Wagers and Phillips (2009), the results support that grammatical knowledge not only constrains the construction of filler-gap dependencies, it actively guides gap-positing in Chinese topicalized sentences.

The following sections provide a linguistic description of topicalization in Chinese, the experimental design and results of the current study.

2.3 The present study

Although normally wh-phrases in Chinese stay in-situ, it has been proposed that Chinese topicalized sentences are derived by movement (Qu, 1994). For example, in (9), the topic *nabenshu* ‘that book’ has been argued to be base generated in the object position after the verb ‘zhidao’ (know), and then moved to the topic position.

(9) *Naben shu ta zhidao*__.

That-CL book he know

‘He knows that book.’

The fact that Chinese topicalized sentences are subject to movement constraints such as the Coordinate Structure Constraint (Lin, 2006) provides support for the movement analysis of topicalization. (12a) is grammatical because the extraction is across the board

while (12b) is ungrammatical as the extraction is only from the first coordinated verb phrase.

(12) a. *Nawei jiaoshou* [xuesheng xihuan__dan laoshi taoyan __].

That-CL professor student like but teacher hate

‘That professor the students like but the teachers hate.’

b. **Nawei jiaoshou* [xuesheng xihuan__dan laoshi taoyan xiaozhang].

That-CL professor student like but teacher hate principal

‘*That professor the students like but the teachers hate the principal.’

The existence of parasitic gaps (pg) in Chinese has been supported by several studies (Lin, 2005; Ting & Huang, 2008). It is argued that parasitic gaps are licensed by overt syntactic movement. In topicalized sentences, parasitic gaps are licensed by A'-movement of the topic, like ‘zhege ren’ (this person) in (13), from the syntactic subject position to the topic position.

(13) *zhege ren*, [[ni jian-guo pg zhihou] yongyuan bu hui wangji t]

this-CL person you saw after forever not will forget

‘This man, you will never forget after seeing.’

There is an alternative interpretation that the so-called parasitic gap is actually an empty pronominal. One difference between a parasitic gap and an empty pronominal is that a gap is part of a dependency which involves syntactic movement and that movement is subject to the Subjacency condition while an empty pronominal does not involve

movement and thus is immune to movement constraints. Subjacency condition suggests extraction across bounding nodes (DP and TP) is grammatically prohibited (Chomsky, 1977). In (12a) there is only one bounding node between e_2 and the operator (OP_1), while there are two bounding nodes between them in (14b). The grammaticality contrast between (14a) and (14b) shows that e_2 is subject to Subjacency condition. Therefore if e_2 is an empty pronominal, (14b) would be grammatical, which is disconfirmed.

(14) a. [_{CP} OP_1 *dajia* [_{CP} OP_2 *zai zuojia xie-le* e_2 *zhihou*] *dou mai* e_1]

Everyone at writer wrote after all buy

de naben shu

DE that-CL book

‘the book which everyone bought after the writer wrote it’

b. * [_{CP} OP_1 [_{CP} OP_2 *zai zongtong* [_{CP} *yinwei* *zuo* *jia xie-le* e_2] *er xiatai*

at president because writer wrote so resign

yihou] dajia dou mai e_1 *] de naben shu*

after everybody all bought DE that-CL book

‘the book which everyone bought after the President resigned because the writer wrote it’

In (14), e_2 is a parasitic gap as it is constrained by the Subjacency condition. The argument is consistent with Huang (1984)’s proposal that empty pronominal in object position is not permitted in Chinese.

Construction of filler-gap dependencies in Chinese topicalized sentences is supported by Huang and Kaiser (2009). They extended Phillips (2006) to Chinese topicalized sentences with parasitic gaps. Adverbial clause is an island in Chinese, but a gap after a transitive verb (for instance, ‘try’) in an adverbial clause can be rescued by another gap in the main clause, thus (15a, b) is grammatical. However, an adverbial clause becomes a strong island if it contains a coverb phrase (for instance, ‘with’ phrase), and extraction from the coverb phrase is prohibited; (15c, d) represents the strong island condition in which a coverb ‘tong’ (with) is contained and thus gap after it is not allowed. Plausibility between topicalized arguments and verbs inside the adverbial clauses was also manipulated.

(15) a. **Transitive plausible condition:**

Na-liang biaobang gao keji de Deguo jinkou che, [zai Wang Xiansheng

That-Cl advertise high-tech DE German imported car, at Mr. Wang

shi-guo xuduo changpai de chezi zhihou] *t* ling ta zui xindong.

try-ASP many brands DE car after make him most desire

‘The high-tech imported car from German, after Mr. Wang tried many brands, made him want most.’

b. **Transitive implausible condition:**

Peizhe Wang Xiansheng sichu kan che de Wang Taitai, [zai

Accompany Mr. Wang everywhere look car DE Mrs. Wang, zai

Wang Xiansheng **shi-guo** Xuduo changpai de chezi zhihou] *t* quan ta

Mr. Wang try-ASP many brands DE car after persuade him

mai Riben che.

buy Japanese car

‘Mrs. Wang, who has hunted for cars all around with Mr. Wang, after Mr.

Wang tried many brands, persuaded him to buy a Japanese car.’

c. Coverb plausible condition:

Peizhe Wang Xiansheng sichu kan che de Wang Taitai, [zai

Accompany Mr. Wang everywhere look car DE Mrs. Wang, zai

Wang Xiansheng **tong** pengyoumen taolun henduo ci zhihou] *t* quan ta

Mr. Wang with friends discuss many times after persuade him

mai Riben che.

buy Japanese car

‘Mrs. Wang, who has hunted for cars all around with Mr. Wang, after Mr. Wang

discussed many times with his friends, persuaded him to buy a Japanese car.’

d. Coverb implausible condition:

Na-liang biaobang gao keji de Deguo jinkou che, [zai Wang Xiansheng

That-Cl advertise high-tech DE German imported car, at Mr. Wang

tong pengyoumen taolun henduo ci zhihou] *t* ling ta zui xindong.

with friends discuss many times after make him most desire

‘The high-tech imported car from German, after Mr. Wang discussed many times with his friends, made him want most.’

Consistent results with Phillips (2009) were found: gap positing can only be observed in adverbial clauses containing transitive VPs (15a, b), which are grammatically rescuable positions; plausibility effect cannot be observed when coverb phrases were contained, which are non-rescuable (15c, d). The results show that the grammar plays an active role in construction of filler-gap dependencies in Chinese topicalized sentences. However, coverbs used in Huang and Kaiser (2008) raise a potential concern. Coverbs are words with quality of both verbs and prepositions, and a noun phrase is indispensable after the coverb in a coverb phrase (Li & Thompson, 1981). That there is always a noun phrase after a coverb while the noun after a transitive verb can be moved out of the verb phrase makes the critical comparison (transitive verb vs. coverb) in Huang and Kaiser (2008) problematic to some extent, as it is also possible that the difference observed for verbs and coverbs was not due to the contrast of rescuable and non-rescuable positions, but the requirement of coverbs that no gap is allowed after them. The current study does not involve the comparison between transitive verbs and coverbs, thus manages to avoid the potential limitation.

Building on Wagers and Phillips (2009), the current study examines whether gap-filling is predictive and grammatically-guided in topicalized sentences in Chinese.

3. Experiment

The goal of the self-paced reading study is to test whether native speakers of Chinese process topicalized sentences incrementally, and whether grammatical constraints, in this case, the Coordinate Structure Constraint, guides resolution of filler-gap dependencies in real-time.

3.1 Method

3.1.1 Self-paced reading task

3.1.1.1 Participants

Forty native speakers of Mandarin Chinese were recruited from Chinese community in Lawrence, Kansas and East Lansing, Michigan. They aged from 18 to 29 (mean: 23.5), and were naive to the purpose of the experiment.

3.1.1.2 Materials

The experimental materials included 24 sets of topicalized sentences, each containing four conditions. A 2×2 factorial design was used, with sentence type (coordinated VP, adjunct) and plausibility (plausible, implausible) manipulated. An example is given in (16); there are two verbs in each sentence, and the second verb ('canjia-le', participate) is the critical region in each sentence.

(16) a. Coordinated VP, Plausible

*Nage wanhui / Xiaowang / **zhidao** t / erqie / yiqian/**canjia-le** / liang / ci t/, ...*

That-CL party Xiaowang know and before participated two times ...

‘That party Xiaowang knows and participated in twice before,’

b. Coordinated VP, Implausible

*Nage ren / Xiaowang / **zhidao** t / erqie / **canjia-le** / liang / ci t/, ...*

That-CL person Xiaowang know and participated two times...

‘#That person Xiaowang knows and participated in twice before, ...’

c. Adjunct Clause, Plausible

*Nage wanhui / Xiaowang / **zhidao** t / yinwei / yiqian/**canjia-le** / liang / ci /*

That-CL party Xiaowang know because before participated two times

jiemü biaoyan,...

program performance

‘That party Xiaowang knows because he participated in twice the performance before, ...’

d. Adjunct Clause, Implausible

*Nage ren / Xiaowang/ **zhidao** t/ yinwei / **canjia-le** / liang / ci/*

That-CL person Xiaowang know because participated two times

tade shengri wanhui, ...

his birthday party

‘That person Xiaowang knows because he participated in twice his birthday

before, ...’

The sentence type factor contained two levels: coordinated VP and adjunct clause. In the coordinated condition (16a, b), the second verb ‘canjia-le’ (participate) was contained in a coordinated VP. Coordinated phrases were combined by two coordinators: ‘danshi’ (but) and ‘erqie’ (and); the number of these two coordinators were balanced across the experiment. In the adjunct clause condition (16c, d), the second verb was contained in a post-verbal adjunct clause starting with ‘yinwei’ (because). The adjunct clause condition provided a licit environment for parasitic gaps in the post-verbal adjunct phrase after the second verb in the sentence, but no real parasitic gaps were included; the possible position for parasitic gaps were filled by arguments such as ‘jiemu biao’ (program performance) in (16c) and ‘tade shengri wanhui’ (his birthday party) in (16d).

The key difference between the coordinated structure and the adjunct structure here is that the second coordinated VP in the coordinated VP conditions provided an environment in which gaps are required by the CSC; on the other hand, the post-verbal adjunct in the adjunct clause conditions provided an environment in which gaps are not required by the grammar; they are optional.

The manipulation of sentence type allowed a comparison of gap-positioning in a grammatically obligatory domain and that in a grammatically optional domain, and consequently could provide evidence for the role of grammar in construction of filler-gap dependencies. Specific predictions will be outlined below in the following section.

Plausibility between the topicalized phrase and the second verb in each sentence was also manipulated. The topicalized phrase ‘nage wanhui’ (that party) in (16a) and (16c) was a plausible argument of the critical verb ‘canjia-le’ (participate), as it was natural to participate in a party; while the topicalized phrase ‘nage ren’ (that person) was an implausible argument of the critical verb as it was unnatural to participate in a person. If the parser actively posits gaps at the verb in a given condition, reading time slowdown can be expected at the verb in the implausible condition relative to the plausible condition.

In Wagers and Philips (2009), reading time slowdown was observed in spill-over regions. To ensure that effects, even those appearing in the spillover region following the verb, cannot be due to encountering bottom-up information regarding whether a gap is indeed present, we added two regions between the critical verb and the position for bottom-up information. These two regions consisted of frequency phrases such as *liang / ci* (two times) in (16). Target sentences were divided across four lists using Latin Square design. Therefore each list included twenty-four target sentences, and each participant was only presented with one list.

Seventy-two fillers were also included in the experiment. As all of the target sentences were topicalized sentences, to make sure that participants cannot recognize them by this feature, twenty-four fillers were topicalized sentences and the other forty-eight fillers were non-topicalized sentences. Among the topicalized fillers, twelve of them contained adjunct clauses which have potential parasitic gap positions as the target

sentences, all possible parasitic gap positions were filled by overt arguments; with the fillers, the chance of finding a gap in a possible parasitic gap position and chance of no gap in that position was balanced. In addition, six implausible verb-argument combinations were included in fillers.

3.1.1.3 Predictions

As active resolution of filler-gap dependencies can be reflected by plausibility effect, it can be predicted that if the resolution is guided by the grammar, a plausibility effect can only be observed after the second verb ‘participate’ in the coordinated VP conditions, as it is the position required by the Coordinate Structure Constraint. If the resolution is entirely filler-driven, no plausibility effect can be observed after the second verb in both sentence types as active search could terminate once a gap site is established after the first verb ‘know’ and a thematic role is assigned. If the parser posits gaps for maximal interpretation, plausibility effects can be observed after the second verb in both sentence types.

3.1.1.4 Procedure

A word-by-word non-cumulative moving window self-paced reading task was used. The task was administered on computers via *Paradigm* (Tagliaferri, 2005). In the task, all phrases and punctuations were first masked by a series of dashes; participants were instructed to click on mouse to unmask them. Only one region could be unmasked with each click. When the participant advanced to the next region, the previous region was

masked again. Participants were also instructed to read at a natural speed, and not to take breaks in the middle of reading sentences. Twenty-four target sentences together with ninety-six fillers were presented to each participant; all sentences were randomized.

After each sentence, there was also a comprehension question to help ensure that participants had read the entire sentence. All of the questions were Yes/No questions. After participants unmasked the last region of each sentence, they could see the comprehension question after another click of the mouse, with a ‘Yes’ button and a ‘No’ button under the question. They could respond by clicking on either of the buttons using the mouse. The number of positive and negative answers was balanced.

3.1.2 Plausibility rating study

To confirm the effectiveness of the manipulation of plausibility, a plausibility rating study was also conducted.

3.1.2.1 Participants

All participants from the self-paced reading task took part in this task after finishing the self-paced reading task.

3.1.2.2 Materials

Materials consisted of ninety-six sentences, all of which were sentences derived from target sentences of the self-paced reading task, with a SVO order. Verbs and objects were also from those target sentences. 2×2 design was used, with two factors manipulated: verb type (the first verb or the second verb in those target sentences) and the plausibility

of the argument (the topicalized argument from plausible condition and that from implausible condition). (17) is a set of sentences in this task:

(17) a. First verb, plausible argument

Xiaowang zhidao nage wanhui.

Xiaowang know that-CL party

‘Xiaowang knows that party.’

b. First verb, implausible argument (argument from implausible condition)

Xiaowang zhidao nage ren.

Xiaowang know that-CL person

‘Xiaowang knows that person.’

c. Second verb, plausible argument

Xiaowang canjia-le nage wanhui.

Xiaowang participate that-CL party

‘Xiaowang participated in that party.’

d. Second verb, implausible argument

Xiaowang canjia-le nage ren.

Xiaowang participate that-CL person

‘Xiaowang participated in that person.’

In constructing the sentences for the self-paced reading study, we aimed to ensure that all topicalized arguments could serve as plausible arguments of the first verb in each

sentence, therefore, we expect that both (17a) and (17b) will be relatively plausible; while topicalized arguments in plausible conditions could also serve as plausible arguments of the second verb, topicalized arguments in implausible conditions were implausible arguments of the second verb, consequently (17c) will also be relatively plausible but (17d) will relatively implausible.

The ninety-six sentences were divided into four lists with Latin-square design; each participant was presented with one list.

3.1.2.3 Procedure

Sentences were presented on paper, a five-point scale was provided after each sentence, with '1' being the least plausible and '5' the most plausible. Participants were instructed to rate acceptability of the sentences and circle out a point after reading each sentence.

3.1.2.4 Results

A significant interaction between verb type (the first verb or the second verb in those target sentences) and the plausibility of the argument (the topicalized argument from plausibility condition and that from implausible condition) was found ($p < .001$). Mean score for each condition is shown in Table 1.

Condition	Mean score
1 st verb + argument from plausible conditions e.g. Xiaowang zhidao nage wanhui. <i>Xiaowang know that-CL party</i>	4.70
1 st verb + argument from implausible conditions e.g. Xiaowang zhidao nage ren. <i>Xiaowang know that-CL person</i>	4.70
2 nd verb + argument from plausible conditions e.g. Xiaowang canjia-le nage wanhui. <i>Xiaowang participate that-CL party</i>	4.82
2 nd verb + argument from implausible conditions e.g. Xiaowang canjia-le nage ren. <i>Xiaowang participate that-CL person</i>	1.66

Table 1: mean score for the plausibility rating task

In constructing the sentences for the self-paced reading study, the manipulation of plausibility was only between the topicalized argument and the second verb, not the first verb. Therefore, both in plausible conditions and implausible conditions, topicalized arguments were supposed to be able to serve as plausible arguments of the first verb, which was confirmed by the plausibility rating results. Sentences containing the first verb

and arguments from plausible conditions were rated equally highly as those containing the first verb and arguments from implausible conditions ($p>.1$).

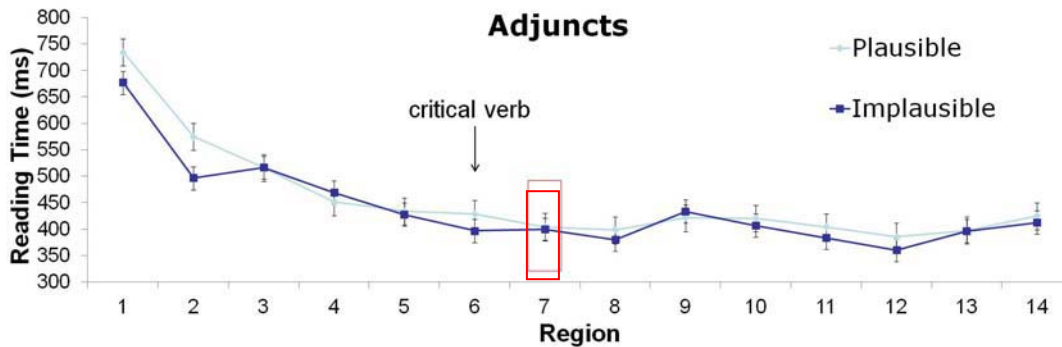
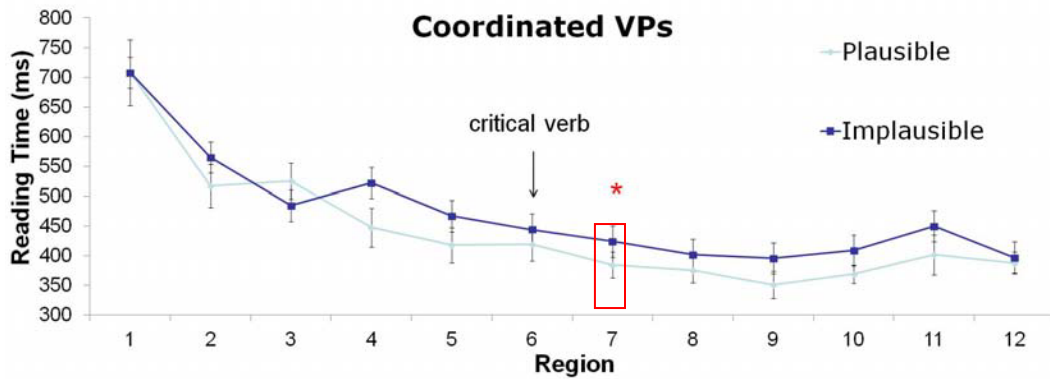
The effectiveness of the plausibility manipulation between topicalized arguments and the second verb was confirmed by the significantly low score for sentences containing the second verb and arguments from implausible conditions compared to the score for sentences containing the second verb and arguments from plausible conditions ($p<.001$).

3.2 Data Analysis and results

Reading times for stimuli were examined region-by-region. Reading times beyond 2.5 SD of the mean at each region were removed; exceptionally fast mean reading times (less than 200 ms) of each participant in each region were also removed. Two participants (5% out of 40) were excluded due to exceptionally slow mean reading times. Trials with incorrect answers to comprehension questions were excluded.

If gap-positing is constrained by grammar, a plausibility effect can be expected in the coordinated VP conditions but not in the adjunct clause conditions. Indeed, this pattern emerged in the spillover region directly following the second verb, resulting in a Plausibility X Sentence Type interaction [$F(1,35)=6.99$, $p<.05$]. Follow-up t-tests revealed a significant reading time slowdown for the Implausible Coordinated VP as compared to its Plausible counterpart ($p<.001$), while no such reading time slowdown

was observed in the Adjunct conditions ($p>.1$). While this interaction was also present at the critical region, at the second verb itself (*participate*) [$F(1,35)=5.89, p<.05$], follow-up t-tests revealed that the interaction emerged only due to a marginal reading time slowdown for the Plausible Adjunct sentences ($p<.1$).



Coordinate: Nage **wanhui**/Nage **ren**₁ Xiaowang₂ **zhidao**₃ t erqie₄ yiqian₅ **canjia-le**₆ liang₇ ci₈ t,...

That-CL party/#That-CL person Xiaowang know and before participate two times

Adjunct: Nage **wanhui**/Nage **ren**₁ Xiaowang₂ **zhidao**₃ t yinwei₄ yiqian₅ **canjia-le**₆ liang₇ ci₈ ...

That-CL party/That-CL person Xiaowang know because before participate two times

A potential concern was that significant reading time difference was also present before the critical region (Region 6), in Region 4 and Region 5, as the reading time

difference at the spill-over region might be a result of difference before the critical verb. However, at the critical region, no significant reading time difference was observed, which excluded the possibility of potential influence of reading time difference before the critical verb. The slowdown at the spill-over region in implausible conditions compared to plausible conditions reflected the effect of plausibility between the filler and the verb, and consequently provided evidence for gap-positing after the second coordinated verbs, which is the position required by the grammar.

To further exclude the potential influence of the reading time difference before the critical region, each participant's reading time difference in region 4, region 5 (regions before the critical region and with reading time difference) and region 7 (the region in which effects emerged) was calculated. No significant correlation was observed between the reading time difference in region 4 and that in region 7 ($r=.19, p>.1$); neither between region 5 and region 7 ($r=.15, p>.1$). Thus, the possibility that the reading time difference in the spill-over region was influenced by regions before the critical verb can be excluded.

In addition, the region in which the effect was observed is the one directly following the critical verb; no bottom-up information regarding whether there is a missing constituent is available at this point as there are two regions ('two/times') between the critical verb and the missing constituent. Therefore, the slowdown can be attributed to active dependency construction instead of application of cues from input.

In the Adjunct conditions, although there was a marginal reading time slowdown at the critical region, it was in the reverse direction: the plausible condition was read more slowly than the implausible condition. Wagers and Phillips (2009) also found such reading time slowdown in adjunct conditions, but their effect emerged at two regions after the critical region. Lack of reading time slowdown in the right direction in either the critical region or the spill-over region indicates no plausibility effect in this sentence type, and consequently no gaps were posited in post-verbal adjuncts, where gaps were not required by the grammar.

3.3 Discussion

In the Coordinated VP structure, there was significant reading time slowdown at the spill-over region (the region right after the second coordinated verb) for implausible fillers relative to plausible fillers, suggesting that a second gap was posited in the coordinated structure. Meanwhile, in the adjunct structure, no reading time slowdown was observed at the second verb (the verb in the adjunct) or in spill-over region for implausible conditions compared to plausible conditions, which suggests that no second gap was posited in the adjunct structure. The pattern observed excludes the possibility of the maximal interpretation account, as according to which a second gap should be posited in both the coordinated structure and the adjunct structure. The possibility of the filler-driven account is also excluded as it suggests no second gap will be posited either in the coordinated structure or the adjunct structure. The results provide evidence for the

grammatical-driven account, as it is shown that the parser only resolves filler-gap dependencies in grammatically required positions (in the second coordinated VP, not in the post-verbal adjunct in this case), grammatical knowledge is used in motivating the active search for gap positions when required by the grammar, which is consistent with Wagers and Phillips (2009).

The investigation of the resolution of wh-dependencies informs debates on what kind of information the parser utilizes during on-line sentence processing. However, evidence that the parser avoids constructing filler-gap dependencies in islands, as has been provided in many previous studies, is not strong enough to argue for the utilization of the grammar in processing, because of the alternative interpretation that islands are simply processing bottlenecks. The current study in contrast provides positive evidence that the parser resolves filler-gap dependencies only in grammatically required positions, without waiting for bottom-up information. It provides evidence that real time processing is incremental and grammatically guided.

The results also converge with Huang and Kaiser (2008) in providing evidence for the construction of filler-gap dependencies in Chinese topicalized structures. However, unlike Huang and Kaiser (2008), the current study does not involve the comparison between coverbs and transitive verbs, which, as was discussed earlier, is a limitation of their stimuli. In the present study, the grammatically required gap positions and optional gap positions are constructed with a contrast between the coordinated structure and the

adjunct structure; critical regions are identical across conditions. Therefore, this study is able to provide stronger evidence for grammatically promoted resolution of filler-gap dependencies in Chinese topicalization.

4. Conclusions

Incremental construction of filler-gap dependencies after the second verb in the coordinated VP conditions but not in the adjunct clause conditions indicates that the parser is sensitive to the Coordinated Structure Constraint; it is consistent with the grammatically-driven prediction. These results demonstrate, in line with Wagers and Phillips (2009), that grammatical knowledge actively guides the incremental resolution of filler-gap dependencies, providing evidence that on-line sentence processing is incremental and grammatically guided. These results also converge with those of previous studies (Huang & Kaiser, 2008) providing evidence for the establishment of filler-gap dependencies in a new domain: topicalization in Chinese, a language without overt wh-movement.

References

- Aoshima, S., Phillips, C. & Weinberg, A. (2004). Processing filler-gap dependencies in a headfinal language. *Journal of Memory and Language*, 51, 23–54.
- Chomsky, N. (1977). On wh-movement. In P. Culicover, T. Wasow, & A. Akmajian (Eds.), *Formal Syntax* (pp. 71–132). New York: Academic Press.
- Crain, S. & Fodor, J. D. (1985). How can grammar help parsers? In D. Dowty, L. Karttunen, & A. M. Zwicky (Eds.), *Natural language parsing: psycholinguistics, computational, and theoretical perspectives* (pp. 94-128). Cambridge: Cambridge University Press.
- Deane, P. (1991). Limits to attention: a cognitive theory of island phenomena. *Cognitive Linguistics*, 2, 1-63.
- Hofmeister, P. & Sag, I. (2010). Cognitive constraints and island effects. *Language*, 86, 366-415.
- Huang, C.-T. J. (1984). On the distribution and reference of empty pronouns. *Linguistic Inquiry*, 15, 531-574.
- Huang, Y-C. & Kaiser, E. (2008). Investigating Filler-Gap Dependencies in Chinese Topicalization. *Proceedings of the 20th North American Conference on Chinese Linguistics*, 2, 927-941.

- Kluender, R. & Kutas, M. (1993). Subjacency as a processing phenomenon. *Language and Cognitive Processes*, 8, 573-633.
- Kluender, R. (2004). Are subject islands subject to a processing account? In V. Chand, A. Kelleher, A. J. Rodriguez, & B. Schmeiser (Eds.), *23rd West Coast Conference on Formal Linguistics* (pp. 514–527). Somerville, MA: Cascadilla Press.
- Lee, M-W. (2004). Another look at the role of empty categories in sentence processing (and grammar). *Journal of Psycholinguistic Research*, 33, 51–73.
- Li, C. N. & Thompson, S. A. (1981). *Mandarin Chinese: a Functional Reference Grammar*. Berkeley: University of California Press.
- Lin, J. (2005). Does wh-in-situ license parasitic gaps? *Linguistic Inquiry*, 36, 298-302.
- Lin, T.-H. (2006). Syntactic structures of complex sentences in Mandarin Chinese. *Nanzan Linguistics*, 3, 63-97.
- McElree, B. & Griffith, T. (1998). Structural and lexical constraints on filling gaps during sentence processing: A time-course analysis. *Journal of Experimental Psychology: Learning, Memory, and Cognition*, 24, 432-460.
- Omaki, A., Lau, E. F., Davidson White, I., & Phillips, C. (2010). Hyper-active gap filling: Pre-verbal object gap creation in English filler-gap dependency processing. *Poster presented at Architectures and Mechanisms of Language Processing (AMLaP)*. York, UK.

- Pickering, M.J., Barton, S. & Shillcock, R. (1994). Unbounded dependencies, island constraints and processing complexity. In C. Clifton Jr., L. Frazier & K. Rayner (Eds.), *Perspectives on sentence processing* (pp. 199-224). London: Lawrence Erlbaum.
- Phillips, C. (2006). The real-time status of island phenomena. *Language*, 82, 795-823.
- Qu, Y-F. (1994). *Object Noun Phrase Dislocation in Mandarin Chinese*. Ph.D. dissertation, University of British Columbia.
- Ross, J. R. (1967). *Constraints on Variables in Syntax*. Ph.D. dissertation, MIT.
- Stowe, L. (1986). Evidence for on-line gap location. *Language and Cognitive Processes*, 1, 227-245.
- Ting, J. & Huang, Y-C. (2008). Some Remarks on parasitic gaps in Chinese. *Concentric: Studies in Linguistics*, 34, 27-52.
- Tagliaferri, B. (2005). *Paradigm: Perception Research Systems, Inc (Version 1.0)* [Software]. Retrieved from <http://www.perceptionresearchsystems.com>.
- Traxler, M. J. & Pickering, M. J. (1996). Plausibility and the processing of unbounded dependencies. *Journal of Memory and Language*, 35, 454-475.
- Wagers, M. W. & Phillips, C. (2009). Multiple dependencies and the role of the grammar in real-time comprehension. *J. Linguistics*, 45, 395-433.

Appendices

Appendix 1. Stimuli

Conditions:

- a. Coordinated VP, Plausible
- b. Coordinated VP, Implausible
- c. Adjunct clause, Plausible
- d. Adjunct clause, Implausible

		Region1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1	a	那本书 that-CL book	很多人 many people	不喜欢 not like	但 but	曾经 before	买过 buy	几 some	次 times	,	这件 this-CL	事情 thing	真 really	奇怪 weird	。		
	b	那个作者 that-CL author	很多人 many people	不喜欢 not like	但 but	曾经 before	买过 buy	几 some	次 times	,	这件 this-CL	事情 thing	真 really	奇怪 weird	。		
	c	那本书 that-CL book	很多人 many people	不喜欢 not like	因为 because	曾经 before	买过 buy	几 some	次 times	那个 that-CL	作者 author	的 DE	作品 book	,	都差不多 all similar	。	
	d	那个作者 that-CL author	很多人 many people	不喜欢 not like	因为 because	曾经 before	买过 buy	几 some	次 times	他的 his	书 book	,	每本 every-CL	都不好 not good	。		
2	a	那些酒 that-CL wine	很多人 many people	知道 know	但 but	只 only	喝过 drink	几 some	次 times	,	味道 taste	可能 maybe	不错 pretty good	。			
	b	那个酒吧 that-CL bar	很多人 many people	知道 know	但 but	只 only	喝过 drink	几 some	次 times	,	味道 taste	可能 maybe	不错 pretty good	。			
	c	那些酒 that-CL wine	很多人 many people	知道 know	因为 because	以前 before	喝过 drink	几 some	次 times	那个 that-CL	味道 taste	,	味道 taste	不错 pretty good	。		
	d	那个酒吧 that-CL bar	很多人 many people	知道 know	因为 because	以前 before	喝过 drink	几 some	次 times	那儿的 there DE	酒 wine	,	味道 taste	不错 pretty good	。		

3	a	那个健身房 that-CL gym	小文 Xiaowen	很熟悉 very familiar	而且 and	曾经 before	去了 go	很多 many	次 times	,	效果 effect	很好 very good	。			
	b	那些跑步机 that-CL treadmill	小文 Xiaowen	很熟悉 very familiar	而且 and	曾经 before	去了 go	很多 many	次 times	,	效果 effect	很好 very good	。			
	c	那个健身房 that-CL gym	小文 Xiaowen	很熟悉 very familiar	因为 because	曾经 before	去了 go	很多 many	次 times	那个 that-CL	地方 place	,	效果 effect	很好 very good	。	
	d	那些跑步机 that-CL treadmill	小文 Xiaowen	很熟悉 very familiar	因为 because	曾经 before	去了 go	很多 many	次 times	学校 school	的 DE	健身房 gym	,	效果 effect	很好 very good	。
4	a	那首歌 that-CL song	小王 Xiaowang	知道 know	而且 and	以前 before	听过 listen	一两 one or two	次 times	,	歌词 lyric	不错 pretty good	。			
	b	那个房子 that-CL house	小王 Xiaowang	知道 know	而且 and	以前 before	听过 listen	一两 one or two	次 times	,	价格 price	很贵 very expensive	。			
	c	那首歌 that-CL song	小王 Xiaowang	知道 know	因为 because	以前 before	听过 listen	一两 one or two	次 times	那个 that-CL	歌词 lyric	,	内容 content	不错 pretty good	。	

	d	那个房子 that-CL house	小王 Xiaowang	知道 know	因为 because	以前 before	听过 listen	一两 one or two	次 times	它的 its	故事 story	， ，	很多人 many people	想去看 看 want to visit it	。		
5	a	那篇英文文章 that-CL English article	他 he	很喜欢 very like	但是 but	只 only	读过 read	一 one	遍 time	， ，	他 he	太忙了 too busy	。				
	b	那个美国作者 that-CL American author	他 he	很喜欢 very like	但是 but	只 only	读过 read	一 one	遍 time	， ，	他 he	太忙了 too busy	。				
	c	那篇英文文章 that-CL English article	他 he	很喜欢 very like	因为 because	以前 before	读过 read	一 one	遍 time	中文版 chinese version	， ，	观点 view	很新 very new	。			
	d	那个美国作者 that-CL American author	他 he	很喜欢 very like	因为 because	以前 before	读过 read	一 one	遍 time	他的 his	文章 article	， ，	观点 view	很新 Very new	。		
6	a	那个问题 that-CL question	老师 teacher	记得 remember	而且 and	以前 before	回答过 answer	几 some	次 times	， ，	答案 answer	很简单 very simple	。				
	b	那种鸟 that kind bird	老师 teacher	记得 remember	而且 and	以前 before	回答过 answer	几 some	次 times	， ，	颜色 color	很好看 very beautiful	。				

	c	那个问题 that-CL question	老师 teacher	记得 remembe -r	因为 because	以前 before	回答过 answer	几 some	次 times	一部分 part	， ，	答案 answer	很简单 very simple 很多人 many people	。 喜欢它 like it			
	d	那种鸟 that kind bird	老师 teacher	记得 remembe -r	因为 because	以前 before	回答过 answer	几 some	次 times	关于它 的 about it	问题 question	， ，	很多人 many people	喜欢它 like it			
7	a	那本中文杂志 that-CL Chinese magazine	约翰 John	记得 remembe -r	而且 and	以前 before	借过 borrow	几 some	次 times	， ，	文章 article	不错 pretty good	。 。				
	b	那个中国人 that-CL Chinese person	约翰 John	记得 remembe -r	而且 and	以前 before	借过 borrow	几 some	次 times	， ，	文章 article	不错 pretty good	。 。				
	c	那本中文杂志 that-CL Chinese magazine	约翰 John	记得 remembe -r	因为 because	以前 before	借过 Borrow	几 some	次 times	这个 This-CL	出版社 publisher	的 DE	书 book	， 文章 article	不错 pretty good		
	d	那个中国人 that-CL Chinese person	约翰 John	记得 remembe -r	因为 because	以前 before	借过 Borrow	几 some	次 times	他的 his	杂志 magazine	， ，	文章 article	不错 pretty good			
8	a	那辆车 that-CL car	李中 LiZhong	比较熟悉 relatively familiar	而且 and	曾经 before	开过 drive	几 some	次 times	， ，	样子 looks	也 also	好看 good looking	。 。			

	b	那个同学 that-CL classmate	李中 LiZhong	比较熟 relatively familiar	而且 and	曾经 before	开过 drive	几 some	次 times	,	他 he	性格 character	很好 very good	。		
	c	那辆车 that-CL car	李中 LiZhong	比较熟 relatively familiar	因为 because	曾经 before	开过 drive	几 some	次 times	那个 that	牌子 brand	,	样子 looks	很好看 very good looking		
	d	那个同学 that-CL classmate	李中 LiZhong	比较熟 relatively familiar	因为 because	曾经 before	开过 drive	几 some	次 times	他的 his	车 car	,	他 he	性格 Character	很好 very good	
9	a	中国菜 Chinese food	玛丽 Mary	很喜欢 very like	但是 but	只 only	尝过 try	几 some	次 times	,	中国 China	饭馆 restaurant	不太多 not many	。		
	b	那个中国朋友 that-CL Chinese friend	玛丽 Mary	很喜欢 very like	但是 but	只 only	尝过 try	几 some	次 times	,	时间 time	不太多 not much	。			
	c	中国菜 Chinese food	玛丽 Mary	很喜欢 very like	因为 because	以前 before	尝过 try	几 some	次 times	各种 various	饺子 dumpling	,	中国 China	饭馆 Restaurant	很便宜 very cheap	。
	d	那个中国朋友 that-CL Chinese friend	玛丽 Mary	很喜欢 very like	因为 because	以前 before	尝过 try	几 some	次 times	他家的 his home's	饺子 dumpling	,	炒饭 fried rice	也 also	很好吃 very delicious	。

10	a	那个晚会 that-CL party	小张 Xiaozhang	知道 know	而且 and	以前 before	参加了 participate	两 two	次 times	， ，	节目 performance	很多 Many	。			
	b	那个女孩 that-CL girl	小张 Xiaozhang	知道 know	而且 and	以前 before	参加了 participate	两 two	次 times	， ，	节目 Performance	很多 Many	。			
	c	那个晚会 that-CL party	小张 Xiaozhang	知道 know	因为 because	以前 before	参加了 participate	两 two	次 times	表演 performance	， ，	事情 things	很多 many	。		
	d	那个女孩 that-CL girl	小张 Xiaozhang	知道 know	因为 because	以前 before	参加了 participate	两 two	次 times	她的 her	生日晚会 birthday party	， ，	大家 everyone	都去了 all go		
11	a	这种水果 this kind fruit	大家 everyone	非常熟 very familiar	而且 and	曾经 before	吃过 eat	很多 many	次 times	， ，	价格 price	也 also	不贵 not expensive	。		
	b	这个老板 this-CL boss	大家 everyone	非常熟 very familiar	而且 and	曾经 before	吃过 eat	很多 many	次 times	， ，	价格 price	也 also	不贵 not expensive	。		
	c	这种水果 this kind fruit	大家 everyone	非常熟 very familiar	因为 because	曾经 before	吃过 eat	很多 many	次 times	它的 its	果酱 jam	， ，	价格 price	也 also	不贵 not expensive	。

	d	这个老板 this-CL boss	大家 everyone	非常熟 very familiar	因为 because	曾经 before	吃过 eat	很多 many	次 times	他店里的 his store DE	水果 fruit	，	价格 price	也 also	不贵 not expensive-ve	。	
12	a	这个班机 this-CL airplane	汤姆 Tom	很了解 very familiar	但是 but	只 only	坐过 take	几 some	次 times	，	时间 time	不合适 not suitable	。				
	b	这个机场 this-CL airport	汤姆 Tom	很了解 very familiar	但是 but	只 only	坐过 take	几 some	次 times	，	时间 time	不合适 not suitable	。				
	c	这个班机 this-CL airplane	汤姆 Tom	很了解 very familiar with	因为 because	曾经 before	坐过 take	几 some	次 times	这个 This-CL	航空公司 airline	，	服务 service	很好 very good	。		
	d	这个机场 this-CL airport	汤姆 Tom	很了解 very familiar	因为 because	曾经 before	坐过 take	几 some	次 times	那儿的 there's	班机 airplane	，	服务 service	很好 very good	。		
13	a	那本中文小说 that-CL Chinese novel	比尔 Bill	很了解 very familiar	但是 but	已经 already	翻译了 transla-te	很长 very long	时间 time	，	语言 language	很难 very difficult-t	。				
	b	那个中国导演 that-CL Chinese director	比尔 Bill	很了解 very familiar	但是 but	已经 already	翻译了 transla-te	很长 very long	时间 time	，	语言 language	很难 very difficult-t	。				

	c	那本中文小说 that-CL Chinese novel	比尔 Bill	很了解 very familiar	因为 because	已经 already	翻译了 transla -te	很长 very long	时间 time	那个 that-CL	作者的 author DE	书 book	，	语言 language -e	很好 very good	。	
	d	那个中国导演 that-CL Chinese director	比尔 Bill	很了解 very familiar	因为 because	已经 already	翻译了 transla -te	很长 very long	时间 time	他的 his	电影 movie	，	情节 plot	很好看 very good	。		
14	a	这个旅馆 this-CL hotel	小美 Xiaomei	记得 remembe r	而且 and	曾经 before	住过 live	很多 many	次 times	，	房间 room	很大 very big	。				
	b	这个服务员 this-CL waitress	小美 Xiaomei	记得 remembe r	而且 and	曾经 before	住过 live	很多 many	次 times	，	人 person	很热情 very warmh ea-rted	。				
	c	这个旅馆 this-CL hotel	小美 Xiaomei	记得 remembe r	因为 because	曾经 before	住过 live	很多 many	次 times	其他 other	地方 place	，	这个 this	最好 best	。		
	d	这个服务员 this-CL waitress	小美 Xiaomei	记得 remembe r	因为 because	曾经 before	住过 live	很多 many	次 times	这个 This-C L	旅馆 hotel	，	人 person	很热情 very warmh- earted	。		
15	a	这座山 this-CL mountain	大中 Dazhong	提起过 mention	但是 but	只 only	爬过 climb	几 some	次 times	，	路 road	很难走 very tough	。				

	b	这个地方 this-CL place	大中 Dazhong	提起过 mention	但是 but	只 only	爬过 climb	几 some	次 times	， ，	路 road	很难走 very tough	。	很美 very beautiful	。		
	c	这座山 this-CL mountain	大中 Dazhong	提起过 mention	因为 because	以前 before	爬过 climb	几 some	次 times	上面的 up's	长城 great wall	，	风景 scenery	很美 very beautiful	。		
	d	这个地方 this-CL place	大中 Dazhong	提起过 mention	因为 because	以前 before	爬过 climb	几 some	次 times	那儿的 there's	山 mountain	，	风景 scenery	很美 very beautiful	。		
16	a	中国画 Chinese painting	凯特 Kate	提起过 mention	而且 and	曾经 before	学了 learn	很长 very long	时间 time	， ，	他的 his	画 painting	很漂亮 very beautiful	。			
	b	中国 China	凯特 Kate	提起过 mention	而且 and	曾经 before	学了 learn	很长 very long	时间 time	， ，	他 he	知道的 know DE	很多 many	。			
	c	中国画 Chinese painting	凯特 Kate	提起过 mention	因为 because	曾经 before	学了 learn	很长 very long	时间 time	东方 oriental	文化 culture	，	他 he	知道的 know DE	很多 many	。	
	d	中国 China	凯特 Kate	提起过 mention	因为 because	曾经 before	学了 learn	很长 very long	时间 time	汉语 Chinese	， ，	他 he	知道的 what he knows	很多 Many	。		

17	a	那个有名的图书馆 that-CL famous library	文文 Wenwen	提起过 mention	但是 but	只 only	参观过 visit	一两次 one or two	次 times	,	书 book	很多 Many	。			
	b	那只图书馆里的猫 that-CL cat in library	文文 Wenwen	提起过 mention	但是 but	只 only	参观过 visit	一两次 one or two	次 times	,	它 it	很可爱 very cute	。			
	c	那个有名的图书馆 that-CL famous library	文文 Wenwen	提起过 mention	因为 because	以前 before	参观过 visit	一两次 one or two	次 times	那儿的 there's	大厅 hall	,	历史 history	很长 very long	。	
	d	那只图书馆里的猫 that-CL cat in library	文文 Wenwen	提起过 mention	因为 because	以前 before	参观过 visit	一两次 one or two	次 times	它的 its	家 home	,	书 book	很多 many	。	
18	a	老板的 DVD boss DE DVD	王乐 Wangle	很了解 very familiar	而且 and	以前 before	整理过 Arrange -e	几 some	次 times	,	他 he	很细心 very careful	。			
	b	那个演员 that-CL actor	王乐 Wangle	很了解 very familiar	而且 and	以前 before	整理过 Arrange -e	几 some	次 times	,	他 he	很细心 very careful	。			
	c	老板的 DVD boss DE DVD	王乐 Wangle	很了解 very familiar	因为 because	以前 before	整理过 Arrange -e	几 some	次 times	他的 his	办公室 office	,	他 he	很细心 very careful	。	

	d	那个演员 that-CLactor	王乐 Wangle	很了解 very familiar	因为 because	以前 before	整理过 Arrang -e	几 some	次 times	他的 his	电影 DVD movie DVD	,	他 he	很细心 very careful	。		
19	a	公共汽车 bus	张新 Zhangxin	不讨厌 not hate	但是 but	只 only	搭过 take	几 some	次 times	,	他 he	自己 self	有车。 have car				
	b	那个司机 that-CL driver	张新 Zhangxin	不讨厌 not hate	但是 but	只 only	搭过 take	几 some	次 times	,	他 he	自己 self	有车。 have car				
	c	公共汽车 bus	张新 Zhangxin	不讨厌 not hate	因为 because	以前 before	搭过 take	几 some	次 times	附近的 nearby DE	班车 bus	,	它 it	很方便 very conveni -ent	。		
	d	那个司机 that-CL driver	张新 Zhangxin	不讨厌 not hate	因为 because	以前 before	搭过 take	几 some	次 times	他的 his	班车 bus	,	他 he	人 person	很好 very good		
20	a	那个公寓 that-CL apartment	亨利 Henry	有点讨 厌 a little hate	但是 but	曾经 before	租了 rent	两 two	年 year	,	房租 rent	不太贵 not very expensi -ve	。				

	b	那个房东 that-CL landlord	亨利 Henry	有点讨厌 a little hate	但是 but	曾经 before	租了 rent	两 two	年 year	， ，	房租 rent	不太贵 not very expensi -ve	。			
	c	那个公寓 that-CL apartment	亨利 Henry	有点讨厌 a little hate	因为 because	曾经 before	租了 rent	两 two	年 year	里面的 inside DE	卧室 bedroom	， ，	房间 room	不太好 not good	。	
	d	那个房东 that-CL landlord	亨利 Henry	有点讨厌 a little hate	因为 because	曾经 before	租了 rent	两 two	年 year	他的 his	公寓 apartmen t	， ，	他 he	人 person	不太好 not good	。
21	a	这次作业 this-CL homework	李红 Lihong	不讨厌 not hate	但是 but	已经 already	做了 do	很长 very long	时间 time	， ，	它 it	有一点 a little	难 difficul -t	。		
	b	这门课 this-CL course	李红 Lihong	不讨厌 not hate	但是 but	已经 already	做了 do	很长 very long	时间 time	， ，	它 it	有一点 a little	难 difficul -t	。		
	c	这次作业 this-CL homework	李红 Lihong	不讨厌 not hate	因为 because	已经 already	做了 do	几 some	次 times	差不多 的 similar	练习 exercise	， ，	它们 they	都 all	不难 not difficul -t	。

	d	这门课 this-CL course	李红 Lihong	不讨厌 not hate	因为 because	已经 already	做了 do	几 some	次 times	有意思 的 interest -ing	作业 homework -k	,	它们 they	很有用 very useful	。		
22	a	那个教授 that-CL professor	小明 Xiaoming	没忘记 not forget	而且 and	以前 before	拜访过 visit	几 some	次 times	,	他 he	人 person	很好 very good	.			
	b	那个论文 that-CL paper	小明 Xiaoming	没忘记 not forget	而且 and	以前 before	拜访过 visit	几 some	次 times	,	它 it	很有用 very useful	。				
	c	那个教授 that-CL professor	小明 Xiaoming	没忘记 not forget	因为 because	以前 before	拜访过 visit	几 some	次 times	他的 his	家 home	,	他 he	人 person	很好 very good	。	
	d	那个论文 that-CL paper	小明 Xiaoming	没忘记 not forget	因为 because	以前 before	拜访过 visit	几 some	次 times	它的 its	作者 author	,	他 he	人 person	很好 very good	。	
23	a	那个汉字 that-CL Chinese character	吉姆 Jim	没忘记 not forget	而且 and	曾经 before	练习了 practice -e	很多 many	次 times	,	他的 his	中文 Chinese e	成绩 score	很好 very good	。		
	b	那本中文书 that-CL Chinese book	吉姆 Jim	没忘记 not forget	而且 and	曾经 before	练习了 practice -e	很多 many	次 times	,	他的 his	中文 Chinese e	成绩 score	很好 very good	。		

	c	那个汉字 that-CL Chinese character	吉姆 Jim	没忘记 not forget	因为 because	曾经 before	练习了 practic e-e	很多 many	次 times	它的 its	写法 writing form	，	他的 his	中文成 绩 Chines- e score	很好 very good	。	
	d	那本中文书 that-CL Chinese book	吉姆 Jim	没忘记 not forget	因为 because	曾经 before	练习了 practic -e	很多 many	次 times	里面的 inside DE	对话 dialogue	，	他的 his	中文成 绩 Chines- e score	很好 very good	。	
24	a	那条路 that-CL road	乐乐 Lele	没忘记 not forget	但是 but	只 only	走过 walk	几 some	次 times	，	风景 scenery	很好 very good	。				
	b	那个饭馆 that-CL restaurant	乐乐 Lele	没忘记 not forget	但是 but	只 only	走过 walk	几 some	次 times	，	东西 things	很好吃 very delicio us	。				
	c	那条路 that-CL road	乐乐 Lele	没忘记 not forget	因为 because	以前 before	走过 walk	几 some	次 times	附近的 nearby DE	街道 street	，	行人 pedestri -an	不多 not many	。		
	d	那个饭馆 that-CL restaurant	乐乐 Lele	没忘记 not forget	因为 because	以前 before	走过 walk	几 some	次 times	它前面 的 before it	路 road	，	风景 scenery	很好 very good	。		